



# **Labs for the 21st Century**

## **Sustainability Opportunities for Mixed-Use Academic Medical Research Facilities**

October 2002

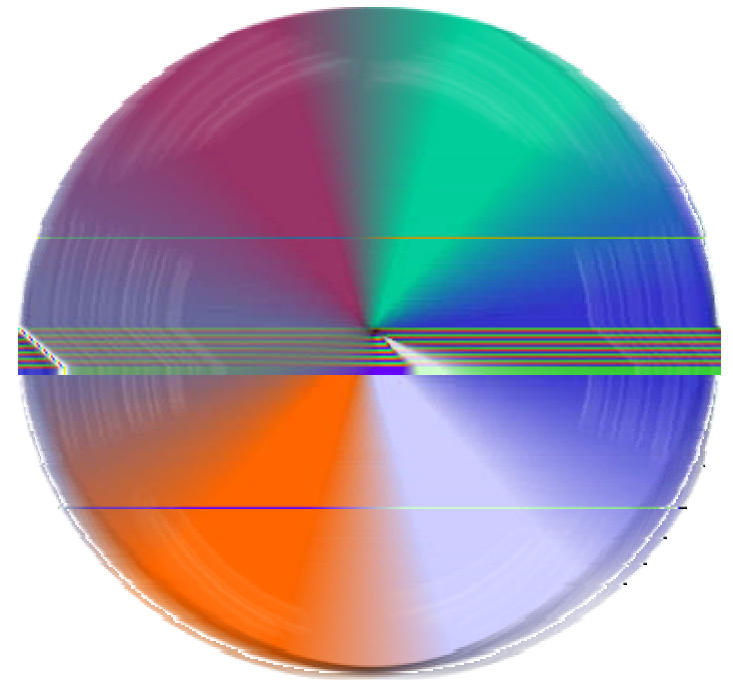
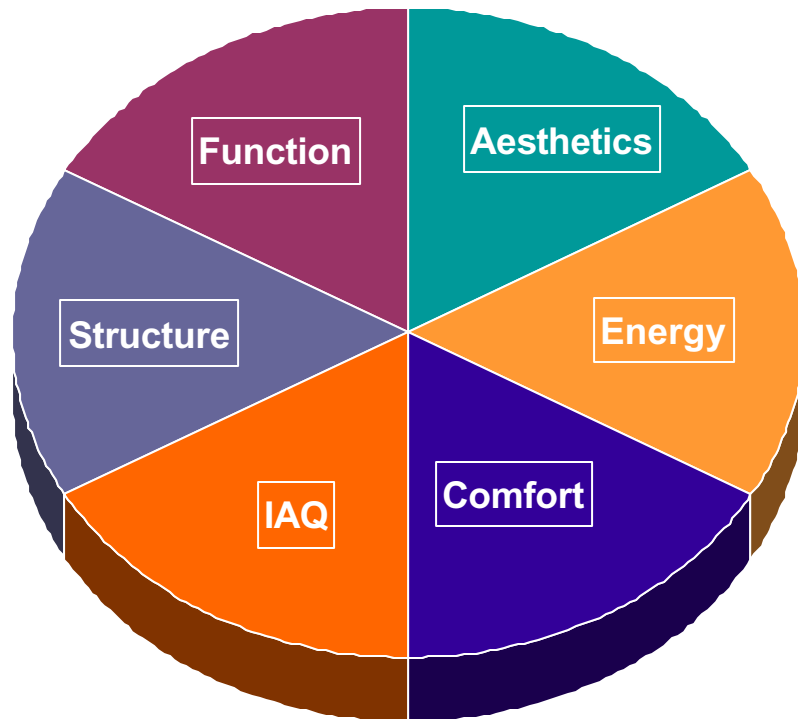
**Stephen C. Turner, PE**  
**Jonathan Friedan, PE**  
**Adrian Tuluca, RA**

# Keys to Maximizing the Opportunities

- **Design Process**
  - Commitment/interest of Owner & A/E Team
  - Pursue every element of incremental change
- **Campus Integration**
  - Use of the large project to set strategic direction
- **Multi-use Flexibility**
  - Handle churn with minimal resource investment

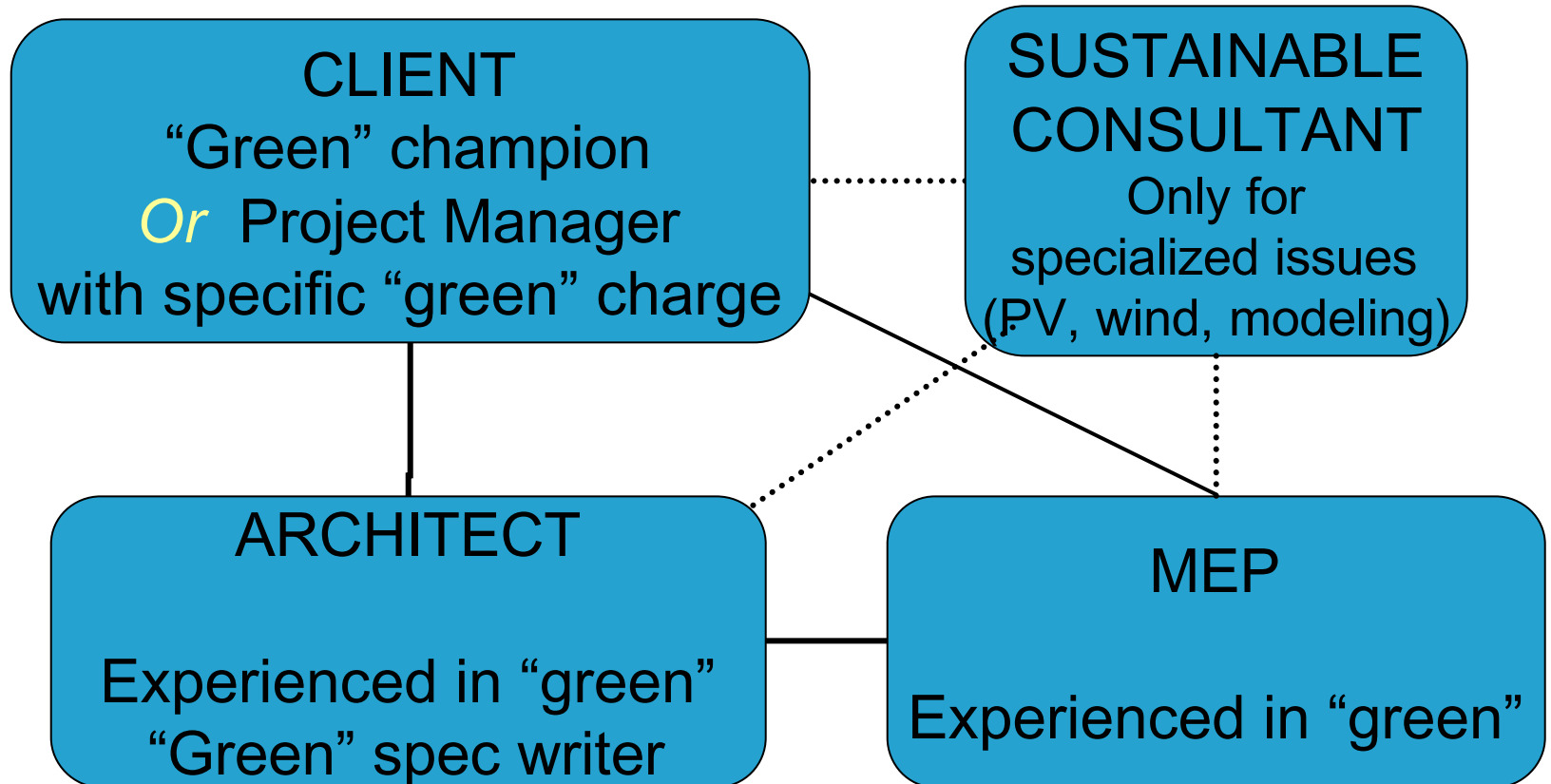
## High Performance Buildings: Add **MUCH KNOWLEDGE ... little money**

### Whole-Building Design

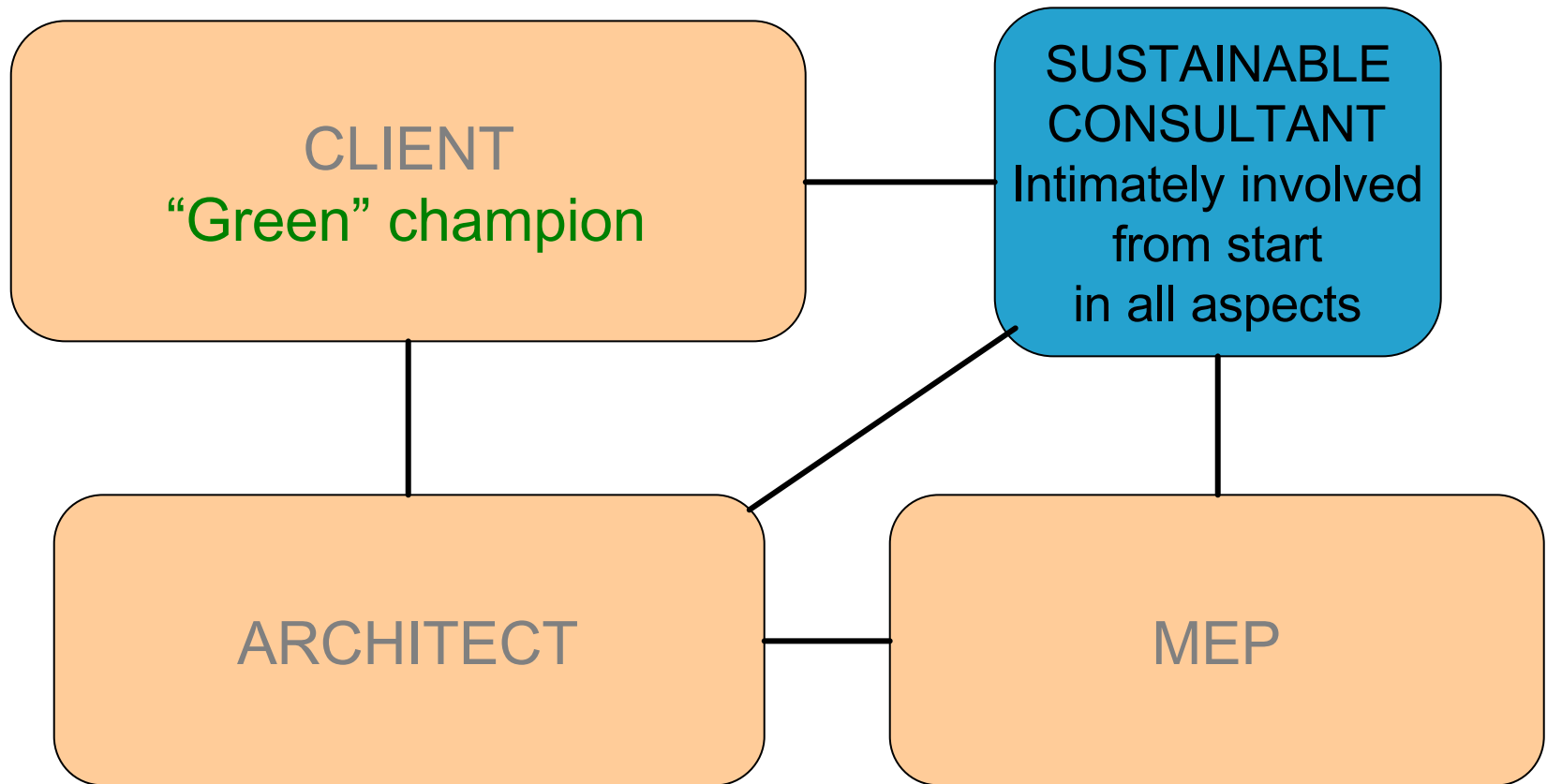


**The Building**

## Sustainable Design – Experienced Team



## Sustainable Design - Inexperienced Team



## **Sustainable Design – The Pitfalls**

- Reluctant client, uninterested design team → gold plating in CD
- Unrealistic expectations because of “green” gurus → first cost surprise
  - Great ideas from Northern Europe and Australia do not work in most U.S. climates. “Green” is climate specific.
  - State-of-the-Shelf vs. State-of-the-Art

### **Project Overview: Large Research Facility**

- **State-of-the-art interdisciplinary research**
  - Cognitive Linguistics, Neuroscience, Molecular Cell Biology; “Dry” & “Wet” Science under one roof
  - Vast range of research, office, and common spaces
  - Approximately 220,000 GSF



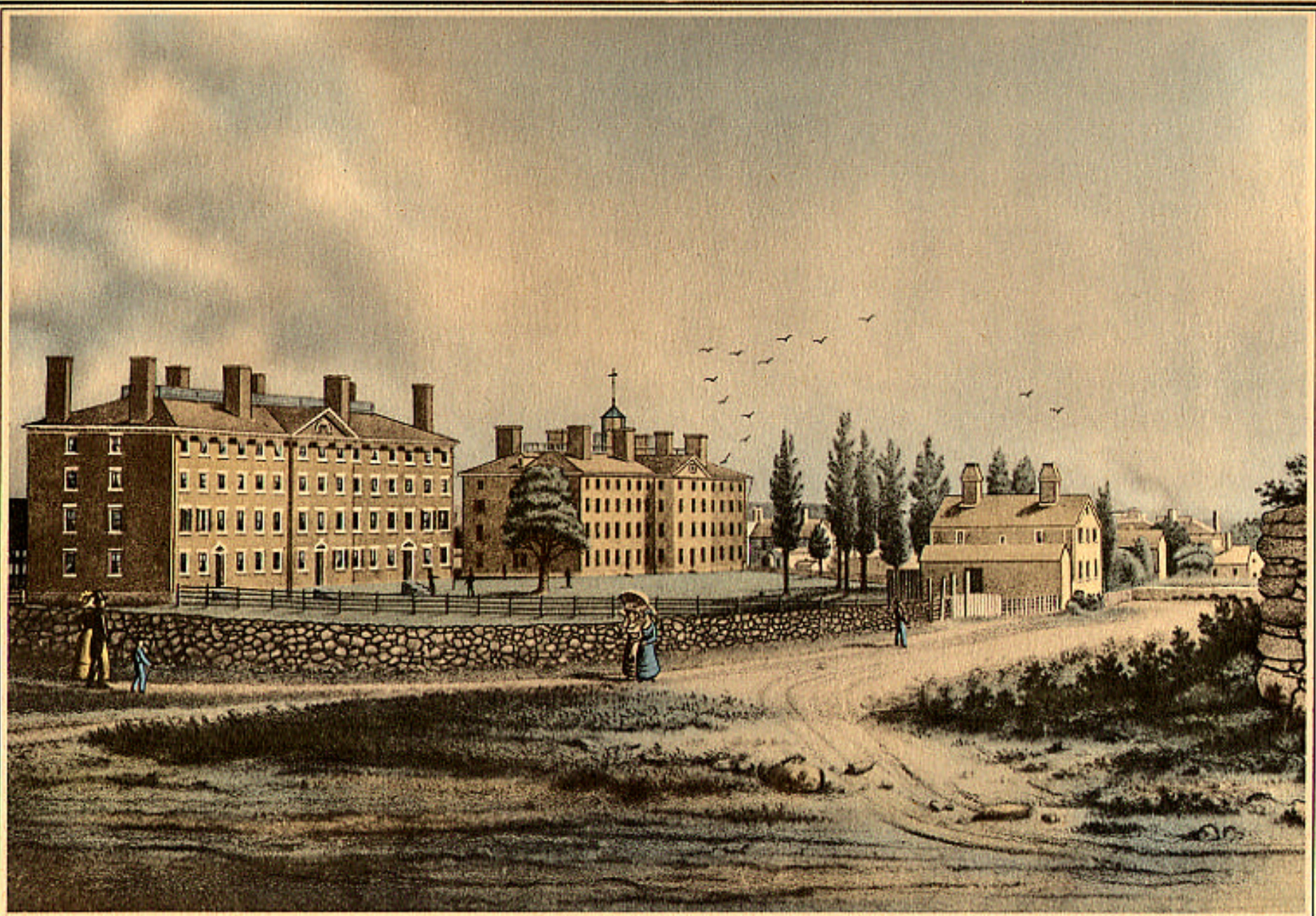




## **Brown's campus today**

- **Urban campus**
  - Over 230 buildings, 5 million sq. ft., 140 acres
- **Utilities**
  - 19 mW grid, 11 & 4 kV electric distribution systems serve 130 major buildings
  - Central Heat Plant, district heat, 3 miles underground HTHW pipe, 30 secondary heat exchangers serve 100 major buildings
  - Dual fuel plant 250,000 lb/hour steam
  - 3 mW cogen
- **Historic buildings & neighborhoods require sensitive adaptive reuse & densification**
  - 4 national historic districts, 6 buildings listed in National Register of Historic Places, 150 contributing structures
  - 2 local historic districts including 30 designated buildings





HOPE COLLEGE

UNIVERSITY HALL

PRESIDENT'S HOUSE

## BROWN UNIVERSITY, ABOUT 1825

*Founded September 6, 1764 — Originally known as the College of Rhode Island. Name changed to Brown University in 1804 — School was closed between 1776 and 1783 during the Revolutionary War and "The College Edifice", now University Hall, was used as barracks by American and French troops.*





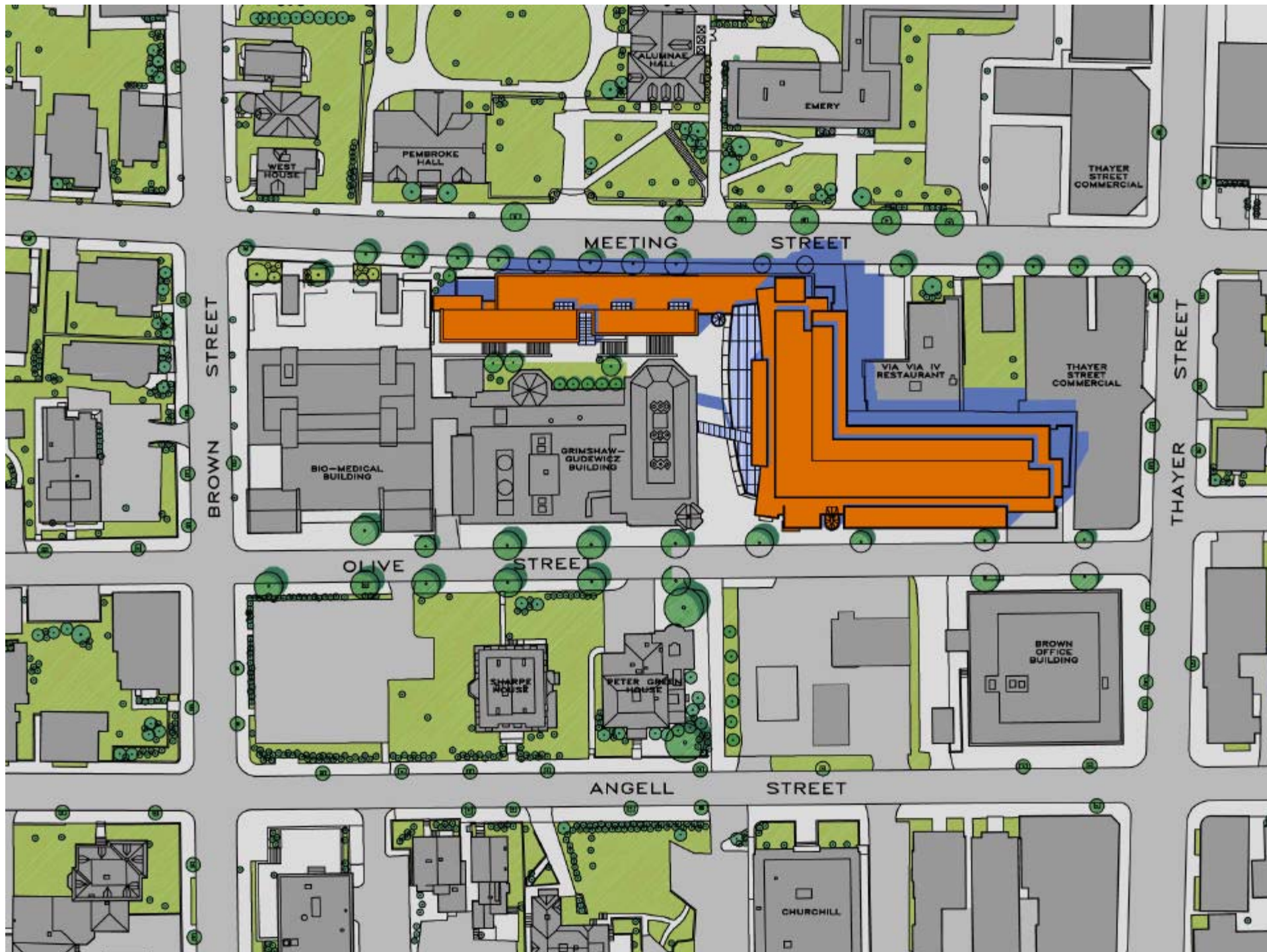




## Site Selection

- **Urban site, no greenfield impacts, shared community amenities**
  - Site utilities available in street
  - Public transit, urban trolley system
- **Clustered with existing research buildings to share utilities & resources**
- **Largely open site — minimal demolition includes under-utilized low density structures**
- **No historic or contributing structures existing**
- **Site reclamation: Doors, card access, fire alarm panels, site & interior fixtures**

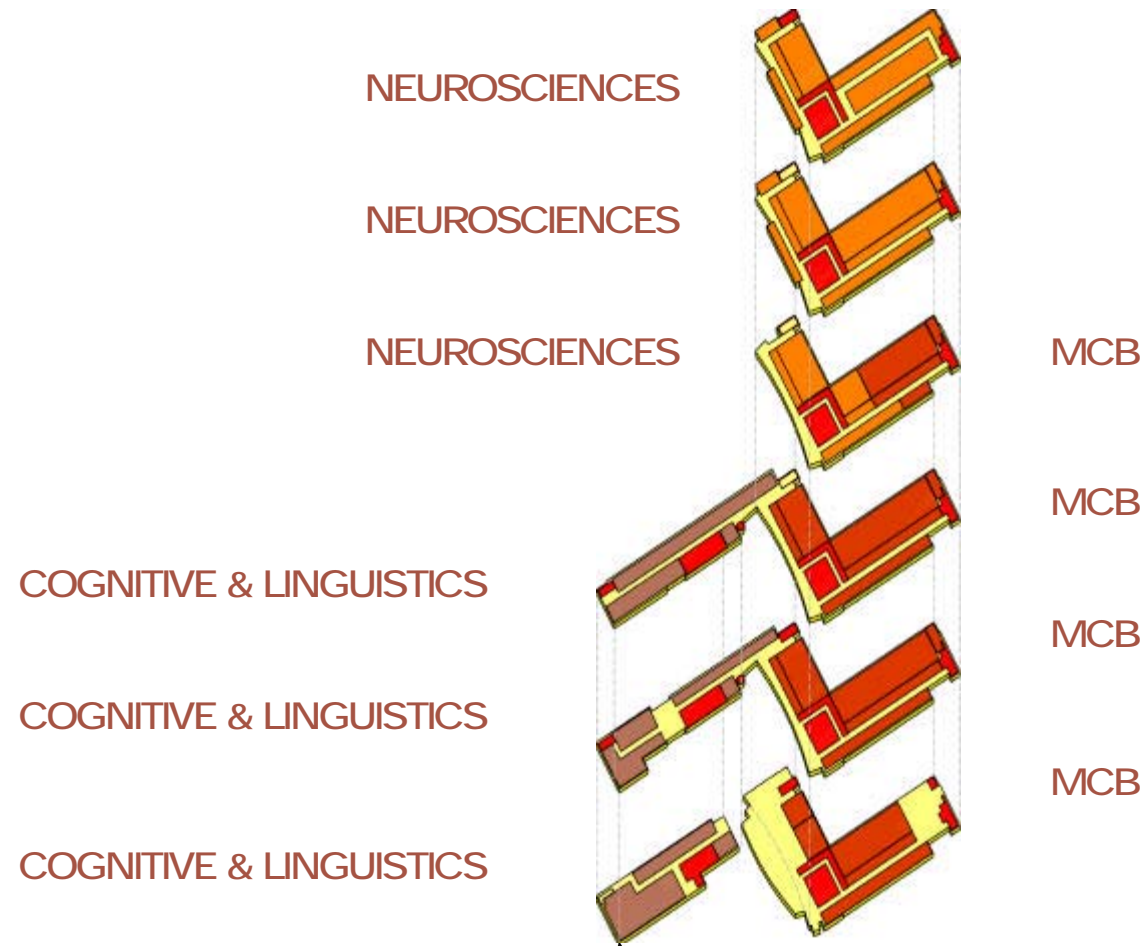








# Multi-use Flexibility



Block & Stack Diagram

### **Diverse Space Types/Key Systems Criteria**

- **Neuroscience**

- Mixture of wet (50%) & dry lab (50%)
- Vibration sensitive equipment (Photo Imaging, Microscopy)
- Testing – acoustic isolation
- Biosafety Level 2

- **Cognitive Linguistics**

- Dry labs
- Sensory isolation
- Conference / seminar / office

### **Diverse Space Types/Key Systems Criteria**

- **Molecular Cell Biology**

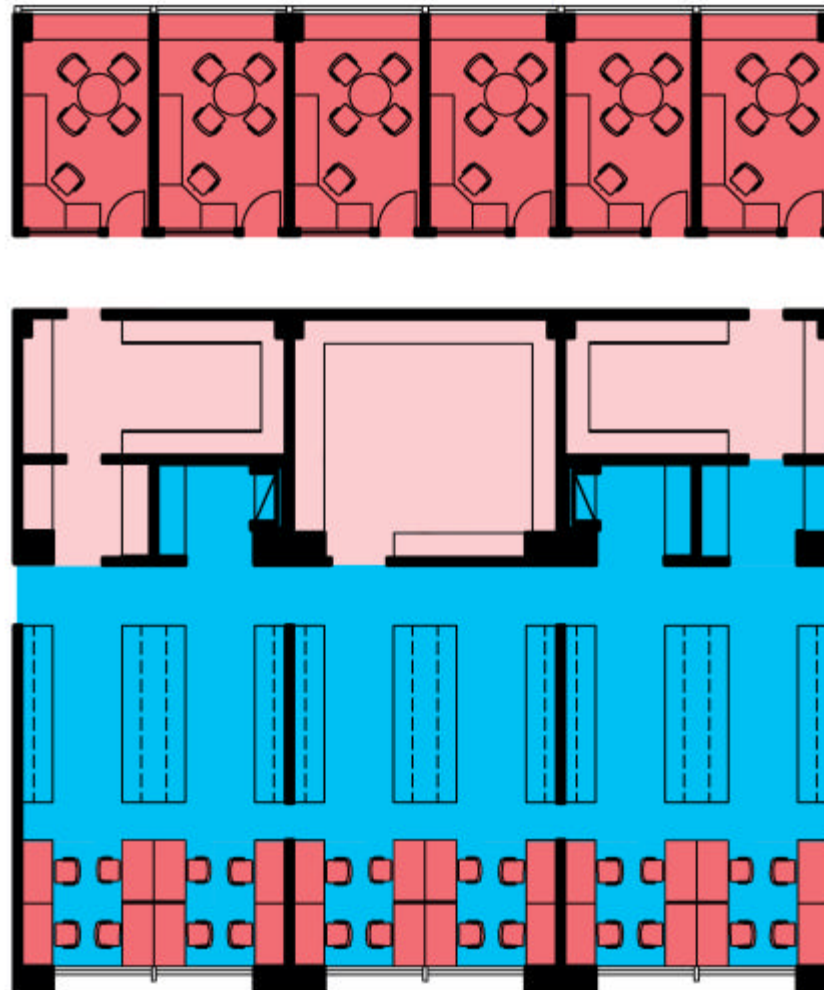
- Primarily wet lab
- Biosafety Level 2
- Equipment (refrigerators, freezers, centrifuges, HPLC, incubators, ovens, chromatographs, autoclaves, etc.)

- **Core Facilities**

- Magnetic Resonance Imaging (9.0 tesla small bore, 3.0 tesla whole body)
- Electron Microscope
- Confocal Microscope (vibration sensitive)

# Multi-use Flexibility

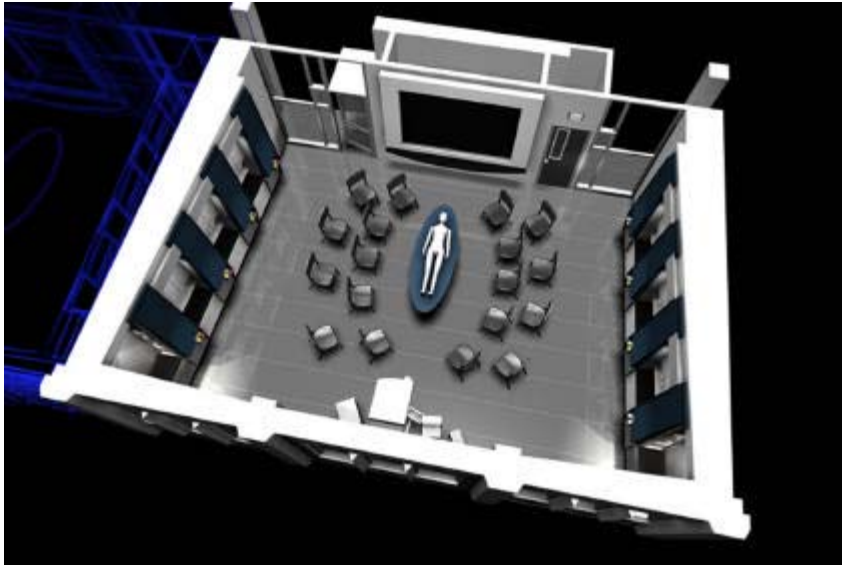
## Brown University



**Elastic boundary: lab to lab support**

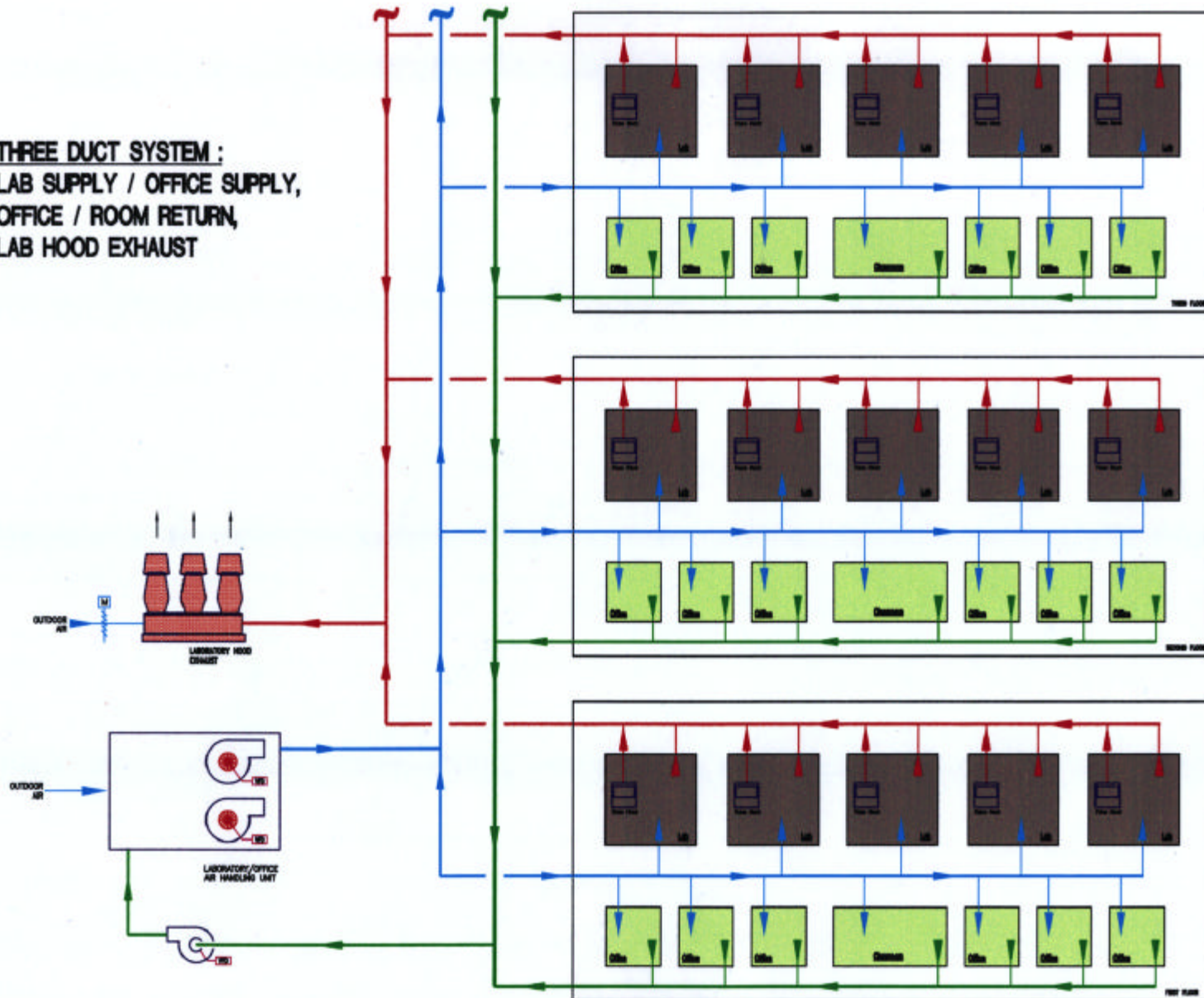
# Multi-use Flexibility

## University of Pennsylvania School of Medicine



# Multi-use Flexibility

**THREE DUCT SYSTEM :**  
LAB SUPPLY / OFFICE SUPPLY,  
OFFICE / ROOM RETURN,  
LAB HOOD EXHAUST





# Multi-use Flexibility

## Rowan University





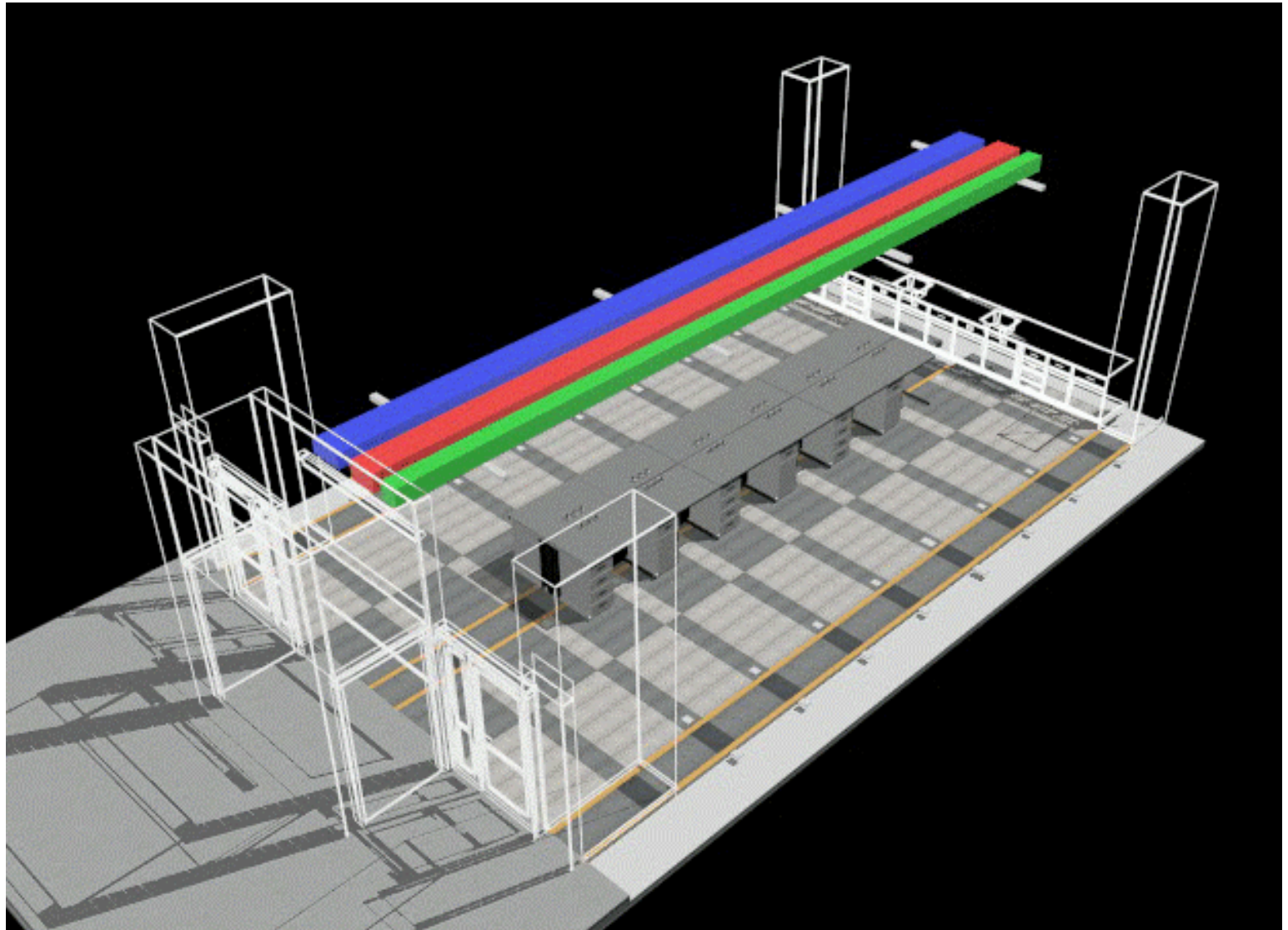
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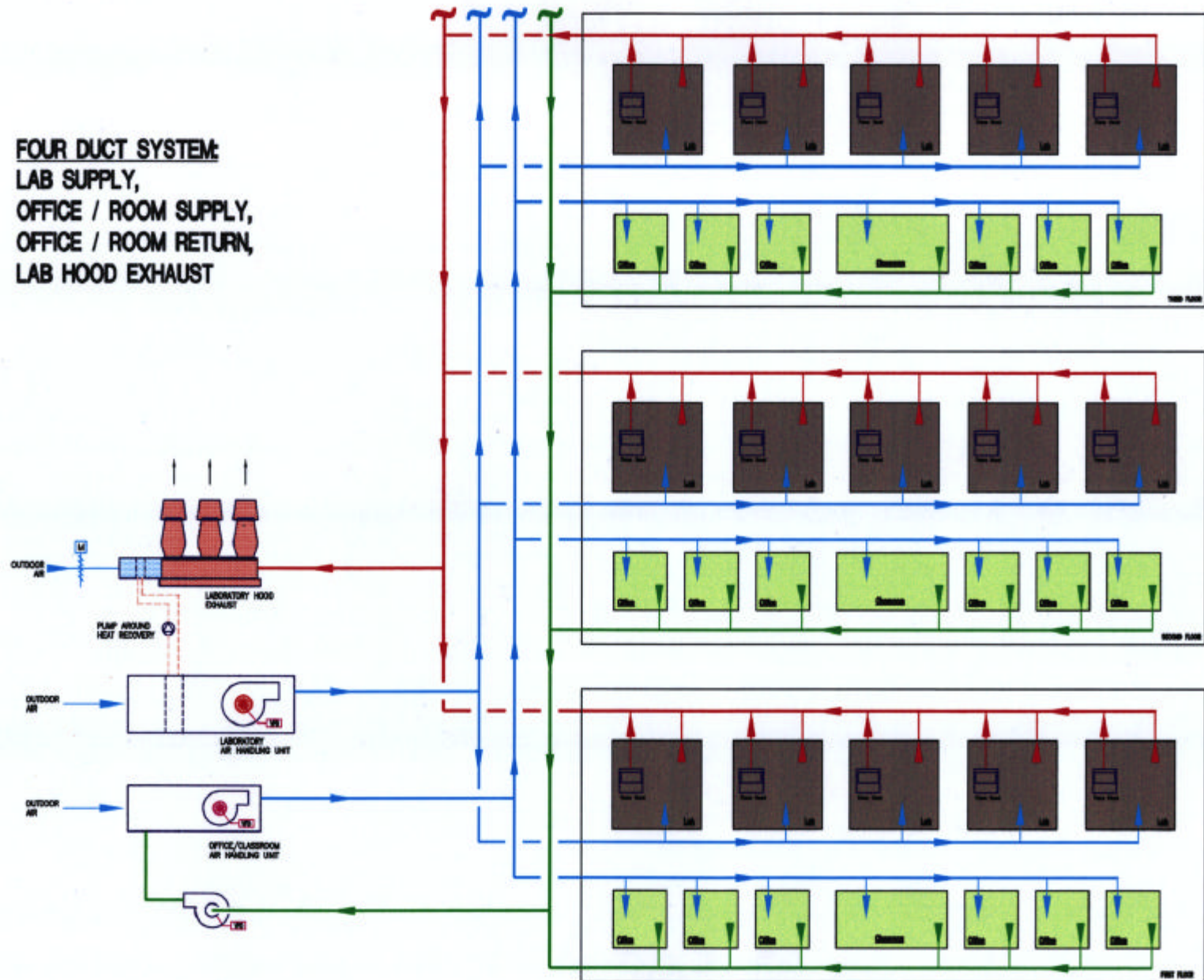
# Multi-use Flexibility

## Rowan University



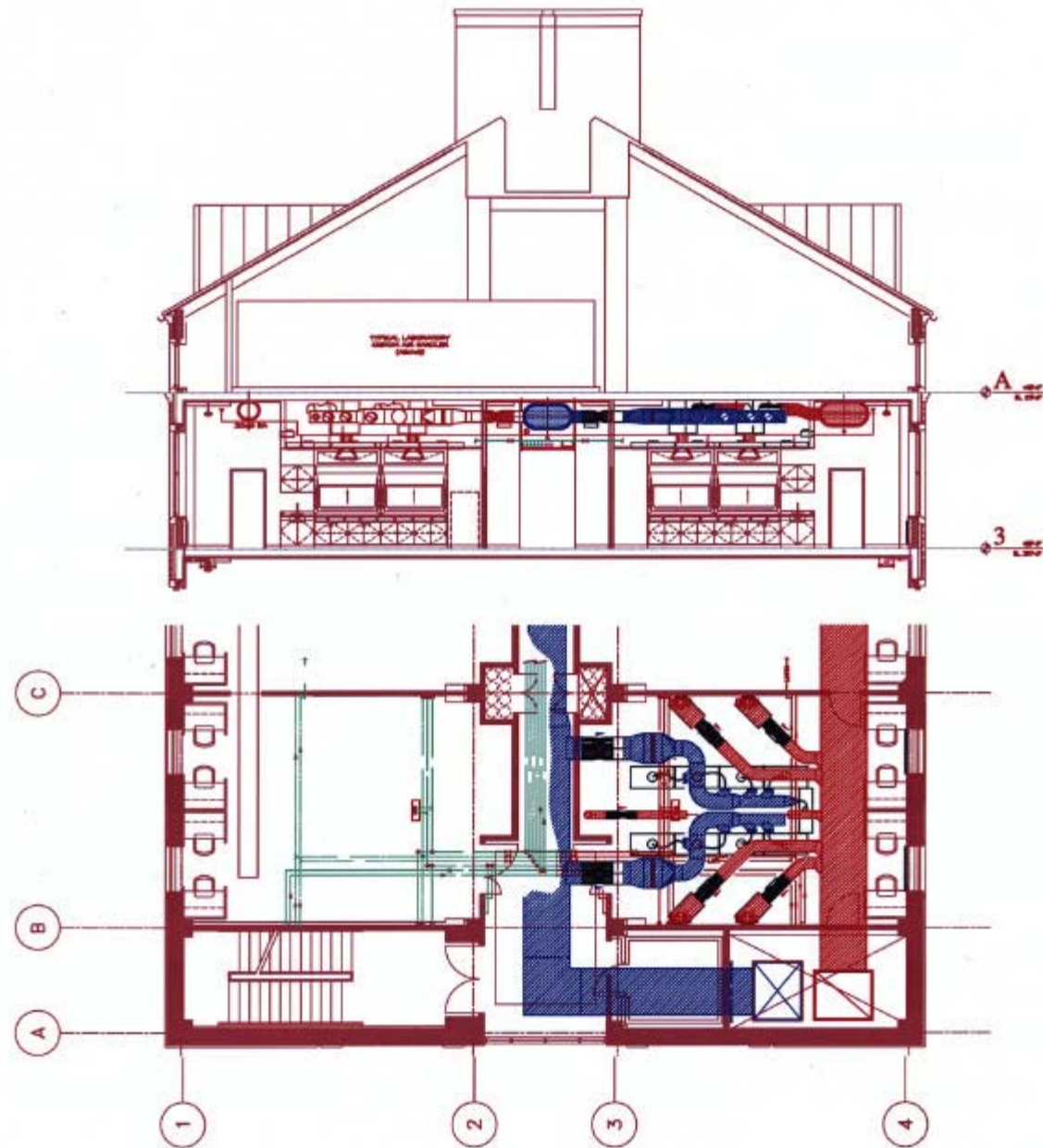
# Multi-use Flexibility

**FOUR DUCT SYSTEM:  
LAB SUPPLY,  
OFFICE / ROOM SUPPLY,  
OFFICE / ROOM RETURN,  
LAB HOOD EXHAUST**



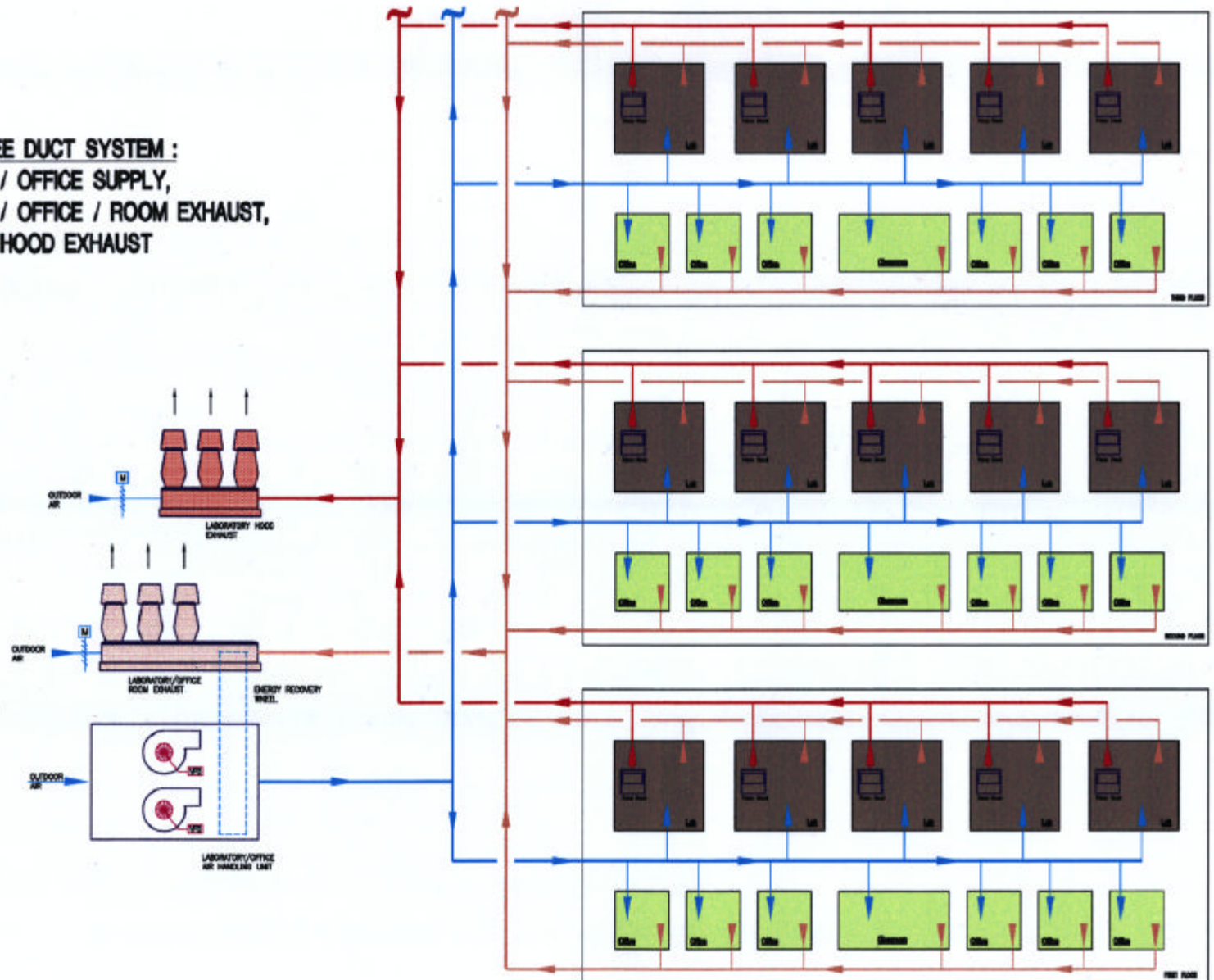


# Multi-use Flexibility



# Multi-use Flexibility

**THREE DUCT SYSTEM :**  
LAB / OFFICE SUPPLY,  
LAB / OFFICE / ROOM EXHAUST,  
LAB HOOD EXHAUST





# Multi-use Flexibility

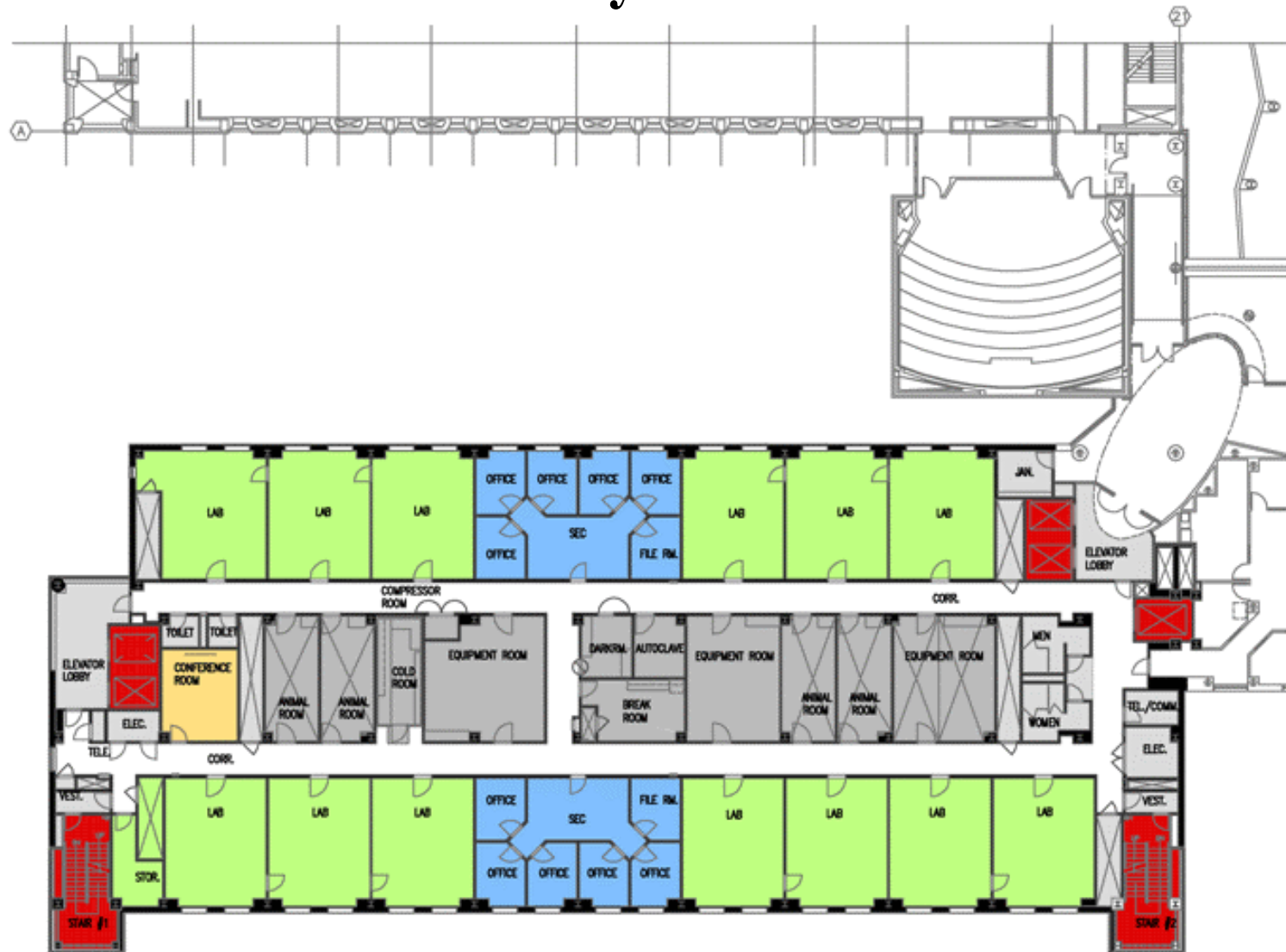
## Wake Forest University





# Multi-use Flexibility

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